

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE LOWER TENNESSEE RIVER WATERSHED

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5.1. BACKGROUND. The Watershed Approach relies on participation at the federal, state, local and nongovernmental levels to be successful. Two types of partnerships are critical to ensure success:

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Group 3 portion of the Tennessee portion of the Lower Tennessee River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

5.2.A. Natural Resources Conservation Service. The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, provides technical assistance, information, and advice to citizens in their efforts to conserve soil, water, plant, animal, and air resources on private lands.

Performance Results System (PRS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRS may be viewed at <http://prms.nrcs.usda.gov/prs>. From the opening menu, select “Reports” in the top tool bar. Next, select “2004 Reports” if it’s active, and “2003 PRMS Reports” if it’s not. Pick the conservation treatment of interest on the page that comes up and reset the date to 2004 Reports if it is not set there. Pick the conservation practice of interest. In the location drop box of the page that comes up, select “Tennessee” and click on the “Refresh” button. In the “By” drop box that comes up, select “Hydrologic Unit” and click on the “Refresh” button. The report of interest can now be viewed.

The data can be used to determine broad distribution trends in service provided to customers by NRCS conservation partnerships. These data do not show sufficient detail to enable evaluation of site-specific conditions (e.g., privately-owned farms and ranches) and are intended to reflect general trends.

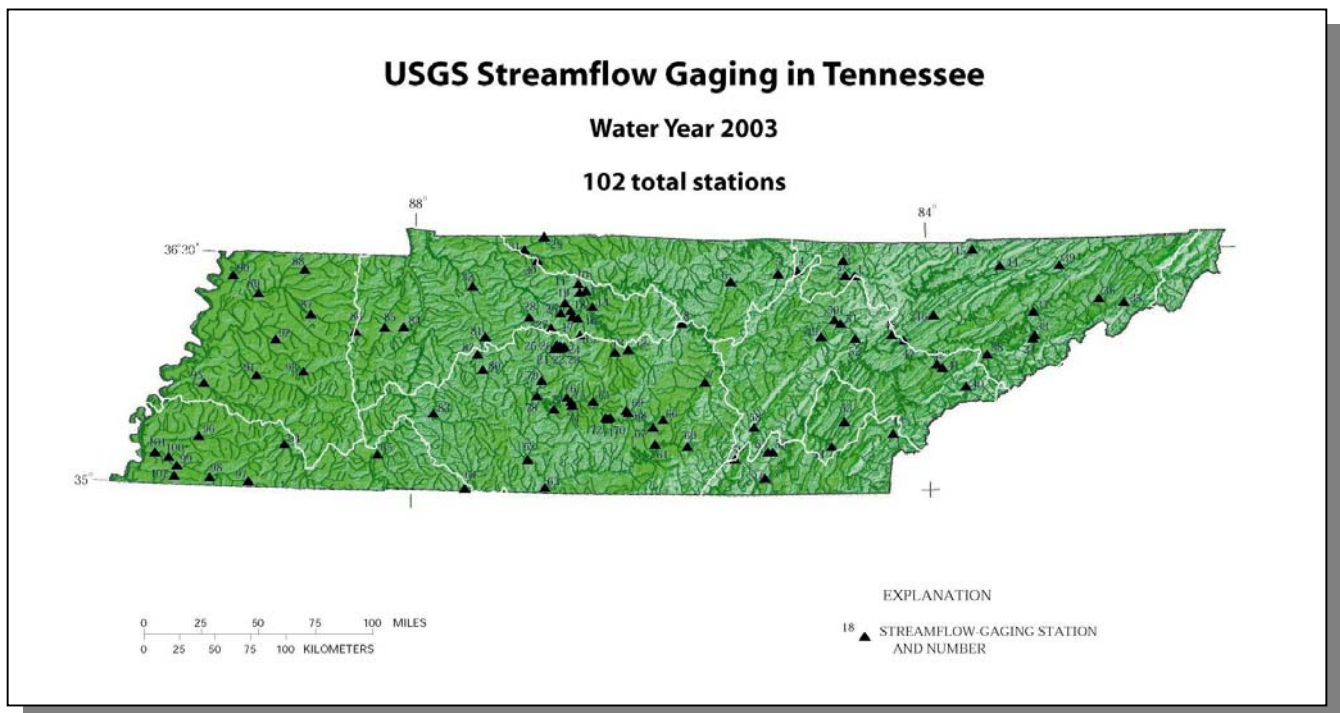
CONSERVATION PRACTICE	TOTAL		
	FEET	ACRES	NUMBER
Comprehensive Nutrient Management Plans		1,756	
Streambank and Shoreline Protection	17,750		
Water Supply	9,985		15
Pest Management		1,885	
Land Treatment: Buffers	27,953	18	
Land Treatment: Surface Water Management		3	
Grazing/Forages Practices	50,982	2,179	

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Group 3 Portion of the Tennessee Portion of the Lower Tennessee River Watershed. Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period. More information is provided in Appendix V.

5.2.B. United States Geological Survey Water Resources Programs – Tennessee District The U.S. Geological Survey (USGS) provides relevant and objective scientific studies and information for public use to evaluate the quantity, quality, and use of the Nation’s water resources. In addition to providing National assessments, the USGS also conducts hydrologic studies in cooperation with numerous Federal, State, and local agencies to address issues of National, regional, and local concern. Please visit <http://water.usgs.gov/> for an overview of the USGS, Water Resources Discipline.

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee, the USGS records streamflow continuously at more than 102 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other locations. Ground-water levels are monitored Statewide, and the physical, chemical, and biologic characteristics of surface and ground waters are analyzed. USGS activities also include the annual compilation of water-use records and collection of data for National baseline and water-quality networks. National programs conducted by the USGS include the National Atmospheric Deposition Program (<http://bqs.usgs.gov/acidrain/>), National Stream Quality Accounting Network (<http://water.usgs.gov/nasqan/>), and the National Water-Quality Assessment Program (<http://water.usgs.gov/nawqa/>). For specific information on the Upper and Lower Tennessee NAWQA studies, please visit <http://tn.water.usgs.gov/ltten/tenn.html>

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water levels, and water-quality data at sites operated by the Tennessee District can be accessed at <http://waterdata.usgs.gov/tn/nwis/nwis>. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus. Contact Donna Flohr at (615) 837-4730 or dflohr@usgs.gov for specific information about streamflow data. Recent publications by the USGS staff in Tennessee can be accessed by visiting <http://tn.water.usgs.gov/pubpg.html>. This web page provides searchable bibliographic information to locate reports and other products about specific areas.



5.2.C. U.S. Fish and Wildlife Service. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with State and Federal agencies and Tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to States for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program

Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. Federally endangered and threatened species in the Tennessee River watershed in Hamilton and Marion Counties, Tennessee, include the bald eagle (*Haliaeetus leucocephalus*), snail darter (*Percina tanasi*), rough pigtoe (*Pleurobema plenum*), pink mucket (*Lampsilis abrupta*), gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), royal marstonia (snail) (*Pyrgulopsis oregonensis*), and large-flowered skullcap (*Scutellaria montana*). For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at <http://www.fws.gov/cookeville/>.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species.

In a partnership with the Tennessee Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Heritage, the Service developed a State Conservation Agreement for Cave Dependent Species in Tennessee (SCA). The SCA targets unlisted but rare species and protects these species through a suite of proactive conservation agreements. The goal is to preclude the need to list these species under the ESA. This agreement covers middle and eastern Tennessee and will benefit water quality in many watersheds within the State.

In an effort to preclude the listing of a rare species, the Service engages in proactive conservation efforts for unlisted species. The program covers not only formal candidates but other rare species that are under threat. Early intervention preserves management options and minimizes the cost of recovery.

Partners for Fish and Wildlife Program

The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types that benefit native fishes and wildlife. The program adheres to the concept that restoring or enhancing habitats such as wetlands or other unique habitat types will substantially benefit federal trust species on private lands by providing food and cover or other essential needs. Federal trust species include threatened and endangered species, as well as migratory birds (e.g. waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

The Service is actively involved with the Natural Resources Conservation Service and private landowners in the Tennessee River watershed in Hamilton and Marion Counties to protect habitat for the Federally endangered royal marstonia (snail) (*Pyrgulopsis ogmorhapse*).

HOW TO PARTICIPATE

- Interested landowners contact a Partners for Fish and Wildlife Biologist to discuss the proposed project and establish a site visit.
- A visit to the site is then used to determine which activities the landowner desires and how those activities will enhance habitat for trust resources. Technical advice on proposed activities is provided by the Service, as appropriate.
- Proposed cost estimates are discussed by the Service and landowner.
- A detailed proposal which describes the proposed activities is developed by the Service biologist and the landowner. Funds are competitive, therefore the proposal is submitted to the Service's Ecosystem team for ranking and then to the Regional Office for funding.
- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).
- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

For more information regarding the Endangered Species and Partners for Fish and Wildlife programs, please contact the Tennessee Ecological Services Field Office at (931)-528-6481 or visit their website at <http://www.fws.gov/cookeville/>.

5.2.D. Tennessee Valley Authority (TVA). TVA's goals for the 21st century are to generate prosperity for the Tennessee Valley by promoting economic development, supplying low-cost, reliable power, and supporting a thriving river system. TVA is committed to the sustainable development of the region and is engaged in a wide range of watershed protection activities. TVA has 7 multidisciplinary Watershed Teams located throughout the Tennessee Valley to help communities actively develop and implement protection and restoration activities in their local watersheds. These teams work in partnership with business, industry, government agencies, and community groups to manage, protect, and improve the quality of the Tennessee River and its tributaries. TVA also operates a comprehensive monitoring program to provide real-time information to the Watershed Teams and other entities about the conditions of these resources. The following is a summary of TVA's resource stewardship activities in the Chickamauga Reservoir.

Reservoir Monitoring

Reservoir Ecological Health. TVA's Reservoir Ecological Health Monitoring program is designed to provide the necessary information from five key ecological indicators (dissolved oxygen, chlorophyll, fish community, benthic macroinvertebrates, and sediment contaminants [PCBs, Pesticides, and Metals]) to evaluate current conditions, provide data for comparing future water quality conditions, and provide for assessments as needed for current and future operations and development.

A part of this monitoring program has been to communicate the data in an easily understandable format. TVA's approach has been to use a Reservoir Ecological Health Score. The ecological health scoring process is designed such that results from each of the five indicators are evaluated based on TVA's reservoir evaluation system and assigned a rating ranging from 1 (poor) to 5 (excellent). To arrive at an overall health evaluation for a reservoir, the sum of the ratings from all sites are totaled, divided by the maximum possible rating for that reservoir, and expressed as a percentage.

TVA monitors ecological conditions at 69 sites on 31 reservoirs. TVA monitored the quality of water resources in Chickamauga Reservoir annually from 1991 through 1995 to establish baseline data on ecological health under a range of weather and flow conditions. These reservoirs are now monitored every other year. Monitoring is conducted at four locations on Chickamauga Reservoir: forebay (TRM 472.3), mid-reservoir (TRM 490.5), inflow (TRM 518-529), and Hiwassee River mile 8.5.

The following charts present Reservoir Ecological Health scores for each year for which data are comparable.

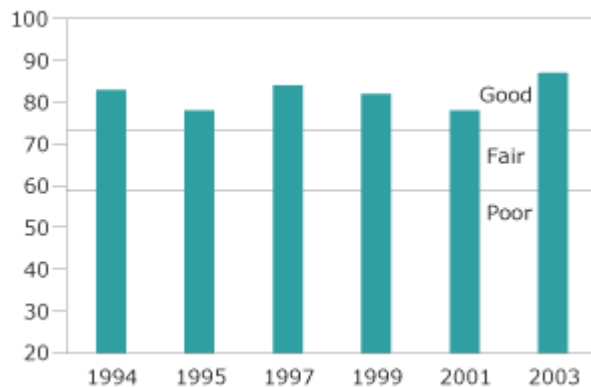


Figure 5-1. Reservoir Ecological Health Ratings for Chickamauga Reservoir (1994-2003)

As in previous years, the ecological health of Chickamauga Reservoir rated good in 2003. However, overall ecological conditions were better in 2003 than in recent years due to the higher-than-normal rainfall and increased reservoir flows, which helped to improve two ecological indicators; DO and chlorophyll. The improved DO likely contributed to the improved bottom life, which rated good at all locations.

Public and Industrial Water Supplies. Adequate water of good quality is essential for sustained population growth and economic development. In conjunction with routine water quality monitoring efforts conducted as part of Reservoir Ecological Health Monitoring, TVA collects additional water samples to be analyzed for parameters of interest to public and industrial water supplies. The purpose of these additional collections is to provide data for use in siting new water supply facilities and determining appropriate design for treatment components. Also, data are available to domestic water suppliers to assist in water treatment operations and diagnosis of abnormal conditions. By combining with routine monitoring, TVA can make these valuable data available to others and incur only the incremental cost associated with laboratory analyses.

More information about Reservoir Ecological Health Monitoring on Chickamauga Reservoir can be obtained by contacting Tyler Baker at (423)-876-6733 or tfbaker@tva.gov or <http://www.tva.gov>.

Bacteriological Monitoring. Recreation is one of TVA's major objectives of the integrated river resource management system. TVA develops, maintains, and promotes public use of several recreational sites. Increased public knowledge about bacterial contamination has heightened the interest in bacteriological levels in recreational waters by both TVA and our stakeholders. Each summer, about 250 swimming areas and informal water contact recreational sites throughout the Tennessee Valley are tested for fecal coliform and/or *Escherichia coli* (*E. coli*) bacteria by TVA's Resource Stewardship. These sites include those operated by TVA and many operated by other agencies. The site list is reexamined annually by the appropriate watershed teams and other TVA organizations to ensure the most heavily used sites are monitored. Bacteriological water sampling is conducted between Memorial Day and Labor Day when people are most likely to be

recreating. Data from this sampling effort is shared in a timely manner with TDEC's Division of Water Pollution Control.

TVA sampled *E. coli* bacteria levels on or around Chickamauga Reservoir in 2004.

On Chickamauga reservoir, the results of the following sites were within the state's guidelines:

- Waconda Bay informal recreation area/TWRA boat ramp
- Chester Frost Park beach
- Harrison Bay Informal Recreation Area
- Eldridge boat ramp
- Grasshopper Creek beach
- Blythe Ferry Landing Site boat ramp
- Cottonport Campground informal swim area
- Frazier Park
- Hixson Greenway Canoe Access-Put-In

One site, Hixson Greenway Canoe Access-Take-Out, had an elevated geometric mean and exceeded the single sample maximum at least one time when compared to the state of Tennessee's guidelines for water contact.

The following sites exceeded the single sample maximum at least one time:

- Savannah Bay Informal Recreation Area boat access site
- Harrison Bay State Park informal swimming area
- Harrison Bay State Park informal swimming area (Inside Park)
- Skull Island Recreation Area
- Possum Creek (East) boat ramp
- Chickamauga Dam TVA beach
- Sale Creek beach
- Armstrong Ferry beach

Some of the elevated *E. coli* concentrations found at these sites may be related to waterfowl presence or collection following a rainfall event.

Fish Flesh Toxic Contaminants. State agencies are responsible for advising the public of health risks from eating contaminated fish. TVA assists the states by collecting fish from TVA reservoirs and checking the tissue for metals, pesticides, PCBs, and other chemicals that could affect human health.

TVA collected channel catfish and largemouth bass from Chickamauga Reservoir for tissue analysis in fall 2003. The results, which were provided to state agencies in Tennessee, were similar to previous years.

More information on bacteriological and fish tissue monitoring on Chickamauga Reservoir can be obtained by contacting Rebecca Hallman at (423)-876-6736 or rlhallman@tva.gov or <http://www.tva.gov>.

Spring Sportfish Survey. TVA conducts its annual spring (March through early June) sportfish survey to help determine the number, age, and general health of black bass and crappie populations in TVA reservoirs. The survey includes twelve 30-minute electrofishing runs covering the various habitat types present. An electric current is used to temporarily stun the fish so that they float to the surface, where they are collected by TVA crews. The fish are then weighed, measured, marked, and released.

This approach to determining fish abundance is used by state game and fish agencies and academia. In addition to accommodating state databases, the surveying method aligns with [TVA Watershed Team](#) and [Reservoir Operations Study](#) objectives, since the sample sites are selected using the shoreline habitat characteristics employed by the Watershed Teams. The results from the 2004 survey, which will be provided to state agencies in Tennessee, are expected in fall 2004.

Spring Sportfish Survey Results for Chickamauga Reservoir from 2000 through 2003:

Parameter	2003	2002	2001	2000
Hours electrofished	18	18	9	16
Total number of black bass	1,118	1,034	208	377
Percent harvestable (over 10 inches)	65.8	59.4	45.2	51
Number of largemouth bass	847	719	170	316
Number of smallmouth bass	32	43	2	0
Number of spotted bass	239	272	36	60
Number of crappie	N/A	108	N/A	N/A
Number of white crappie	N/A	16	N/A	N/A
Number of black crappie	N/A	92	N/A	N/A
Electrofishing catch rate (per hour)	62	57.4	34.5	34
Average weight (pounds)	1.3	1.1	0.81	1
Largest black bass (pounds)	6.4	6.6	2.8	5
Number of fish with disease/parasites	N/A	34	10	11

More information about fish sampling on Chickamauga Reservoir can be obtained by contacting Donny Lowery at (256)-386-2729 or drlowery@tva.gov or <http://www.tva.gov>

Stream Bioassessment

Conditions of water resources in streams within the Chickamauga watershed is measured using three independent methods; Index of Biotic Integrity (IBI), number of mayfly, stonefly, and caddisfly taxa (EPT), and Habitat Assessment. Not all of these tools were used at each stream sample site.

IBI. The index of biotic integrity (IBI) assesses the quality of water resources in flowing water by examining a stream's fish assemblage. Fish are useful in determining long-term (several years) effects and broad habitat conditions because they are relatively long-lived and mobile. Twelve metrics address species richness and composition, trophic structure (structure of the food chain), fish abundance, and fish health. Each metric reflects the condition of one aspect of the fish assemblage and is scored against reference streams in the region known to be of very high quality. Potential scores for each of the twelve metrics are 1-poor, 3-intermediate, or 5-the best to be expected. Scores for the 12 metrics are summed to produce the IBI for the site. The following table associates IBI ranges with attributes of fish assemblages.

<u>Attribute</u>	<u>IBI Range</u>
Comparable to the best situations without influence of man; all regionally expected species for the habitat and stream size, including the most intolerant forms, are present with full array of age and sex classes; balanced trophic structure.	58-60
Species richness somewhat below expectation, especially due to loss of most intolerant forms; some species with less than optimal abundance or size distribution; trophic structure shows some signs of stress.	48-52
Signs of additional deterioration include fewer intolerant forms, more skewed trophic structure (e.g., increasing frequency of omnivores); older age classes of top predators may be rare.	40-44
Dominated by omnivores, pollution-tolerant forms, and habitat generalists; few top carnivores; growth rates and condition factors commonly depressed; hybrids and diseased fish often present.	28-34
Few fish present, mostly introduced or tolerant forms; hybrids common; disease, parasites, fin damage, and other anomalies regularly.	12-22

EPT. The number and types of aquatic insects, like fish, are indicative of the general quality of the environment in which they live. Unlike fish, aquatic insects are useful in determining short-term and localized impacts because they are short-lived and have limited mobility. The method TVA uses involves only qualitative sampling and field identification of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to the family taxonomic level (EPT). The score for each site is simply the number of EPT families. The higher EPT scores are indicative of high quality streams because these insect larvae are intolerant of poor water quality.

Habitat Assessment. The quality and quantity of habitat (physical structure) directly affect aquatic communities. Habitat assessments are done at most stream sampling sites to help interpret IBI and EPT results. If habitat quality at a site is similar to that found at a good reference site, any impacts identified by IBI and EPT scores can reasonably be attributed to water quality problems. However, if habitat at the sample site differs considerably from that at a reference site, lower than expected IBI and EPT scores might be due to degraded habitat rather than water quality impacts.

The habitat assessment method used by TVA (modified EPA protocol) compares observed instream, channel, and bank characteristics at a sample site to those expected at a similar high-quality stream in the region. Each of the stream attributes listed below is given a score of 1 (poorest condition) to 4 (best condition). The habitat score for the sample site is simply the sum of these attributes. Scores can range from a low of 10 to a high of 40.

1. Instream cover (fish)
2. Epifaunal substrate
3. Embeddedness
4. Channel Alteration
5. Sediment Deposition
6. Frequency of Riffle
7. Channel Flow Status
8. Bank vegetation protection - Left bank and right bank, separately
9. Bank stability - Left bank and right bank, separately
10. Riparian vegetation zone width - Left bank and right bank, separately

Sample Site Selection. EPT sampling and fish community assessment (IBI) are conducted at the same sites. Site selection is governed primarily by study objectives, stream physical features, and stream access. TVA's objective is to characterize the quality of water resources within a watershed (11-digit hydrologic unit). Sites are typically located in the lower end of sub-watersheds and at intervals on the mainstem to integrate the effects of land use. A total of 19 sites are sampled in the Lower Chickamauga watershed. These sites are typically sampled every five years to keep a current picture of watershed condition.

Details about Stream Bioassessment and Fixed Station Monitoring (sites and scores) can be obtained by writing Amy Wales at Tennessee Valley Authority, 1101 Market Street, Chattanooga TN 37402 or calling her at (423)-876-6748. E-mail address is akwales@tva.gov

Watershed Assistance-Coalition Support

Citizen Based Organizations. Citizen based watershed organizations can play a critical role in watershed protection. TVA's watershed teams work to strengthen these organizations by providing assistance in the areas of understanding the local watershed, its conditions, impacts, and threats; developing and implementing strategies to protect or improve resource quality; fundraising; river issues; and organizational development.

Interagency Partnerships. The benefits of watershed partnerships are well documented. No one unit of government, agency, group or individual has all the knowledge, expertise or resources to address all watershed issues. Partnerships can tap a diversity of energy, talent, and ideas. Watershed Partnerships can also promote a more efficient use of limited financial and human resources and can identify innovative and efficient means of improving or protecting water quality. TVA's Chickamauga-Hiwassee Watershed Team contributes to several interagency partnerships, including the NCCC Water Quality Team and the Hiwassee Interagency Team.

Outreach

The National Clean Boating Campaign highlights the importance of clean water so boating will continue to be fun and safe for future generations. The program demonstrates how boaters can be good stewards of their water environment through best boating and marina practices. TVA supports Clean Boating events each summer at area marinas and boat ramps.

The Tennessee Valley Clean Marina Initiative is an effort by TVA to promote environmentally-responsible marina practices. A voluntary program, established in support of the National Clean Boating Campaign, helps marina operators protect the resource that provides them with their livelihood. Three marinas in Chickamauga Reservoir have achieved Clean Marina status, and several others are working toward certification.

Protection and Restoration Activities

Promote Best Management Practices. TVA provides funding and technical expertise to assist with installation of best management practices (BMPs) that will reduce non-point pollution. As an example, over the past 5 years the Chickamauga-Hiwassee Watershed Team has partnered with the Hamilton County Soil Conservation District, Natural Resources Conservation Service, and 34 farmers and producers in several watersheds draining into Chickamauga Reservoir. Through this partnership, over 70 BMPs to protect water quality have been installed on area farmlands. Several of the farms were highlighted in the 2004 Hamilton County Farm Tour.

Support Clean Up Efforts. Tennessee River Rescue is a community action event that is in its 16th year. TVA helps sponsor this event, which focuses on shoreline clean-up at 16 sites in the Chickamauga and Nickjack watersheds, attracts 600-700 volunteers and collects 50-60 tons of trash annually, in addition to the retrieval and recycling of tires from our waterways.

Shoreline Stabilization and Riparian Restoration. Working closely with cooperators and partners, the Chickamauga-Hiwassee Watershed Team has implemented innovative and cost effective methods for minimizing the erosion from public lands in Chickamauga Reservoir. During 2003 and 2004 1.73 miles of shoreline was stabilized and protected in Chickamauga Reservoir.

In addition, the team provides technical assistance to stakeholders through individual landowner meetings and public workshops for those interested in learning and applying bio-stabilization and riparian restoration techniques. In the spring of 2004, the team partnered with the City of Collegedale to address a critical erosion problem along the Wolftever Creek Greenway. Through a TVA-funded, hands-on workshop, Collegedale Public Works staff learned and applied appropriate stabilization materials and techniques to stop the erosion and rebuild an undercut section of the Greenway trail along the creek. Native vegetation was then planted along this section of the Greenway to protect the soil from future erosion and serves as a demonstration to Greenway users of the benefits of native vegetation along waterways.

TVA has also developed a series of 11 fact sheets that will enable riparian property owners to restore, manage, and be better stewards of riparian land. The fact sheets are available on the TVA internet site: (<http://www.tva.com/river/landandshore/index.htm>).

Further information on TVA's Watershed Assistance activities in the Chickamauga Watershed can be obtained by writing the Chickamauga-Hiwassee Watershed Team at: Tennessee Valley Authority; 1101 Market Street, PSC-1E; Chattanooga, TN 37402 or calling them at (423)-876-6701.

5.3. STATE PARTNERSHIPS.

5.3.A. TDEC Division of Water Supply. The Source Water Protection Program, authorized by the 1996 Amendments to the Safe Drinking Water Act, outline a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

- 1) Delineate the drinking water source protection area
- 2) Inventory known and potential sources of contamination within these areas
- 3) Determine the susceptibility of the water supply system to these contaminants
- 4) Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
- 5) Implement management measures to prevent, reduce or eliminate threats
- 6) Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies (including natural disaster or terrorist activities).

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, and ground water (wells and springs) that serve as sources of drinking water before they become contaminated. This objective requires locating and addressing potential sources of contamination to these water supplies. There is a growing recognition that effective drinking water system management includes addressing the quality and protection of the water sources.

Source Water Protection has a significant link with the Watershed Management Program goals, objectives and management strategies. Watershed Management looks at the health of the watershed as a whole in areas of discharge permitting, monitoring and protection. That same protection is important to protecting drinking water as well. Communication and coordination with a multitude of agencies is the most critical factor in the success of both Watershed Management and Source Water Protection.

Watershed management plays a role in the protection of both ground water and surface water systems. Watershed Management is particularly important in areas with karst (limestone characterized by solution features such as caves and sinkholes as well as disappearing streams and spring), since the differentiation between ground water and surface water is sometimes nearly impossible. What is surface water can become ground water in the distance of a few feet and vice versa.

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions were available until 2004). The assessments are intended to enhance the protection of drinking water supplies within existing programs at the federal, state and local levels. Source water assessments were mandated and funded by Congress. Source water protection will be

left up to the individual states and local governments without additional authority from Congress for that progression.

As a part of the Source Water Assessment Program, public water systems are evaluated for their susceptibility to contamination. These individual source water assessments with susceptibility analyses are available to the public at <http://www.state.tn.us/environment/dws> as well as other information regarding the Source Water Assessment Program and public water systems.

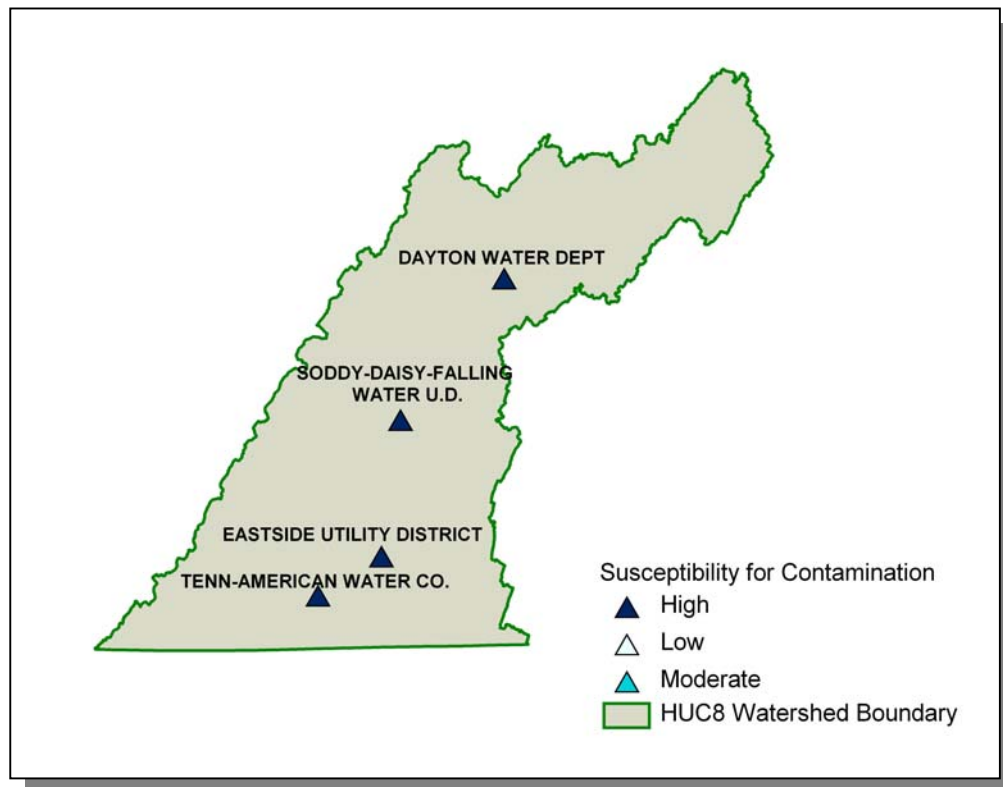


Figure 5-2. Susceptibility for Contamination in the Tennessee River Watershed.

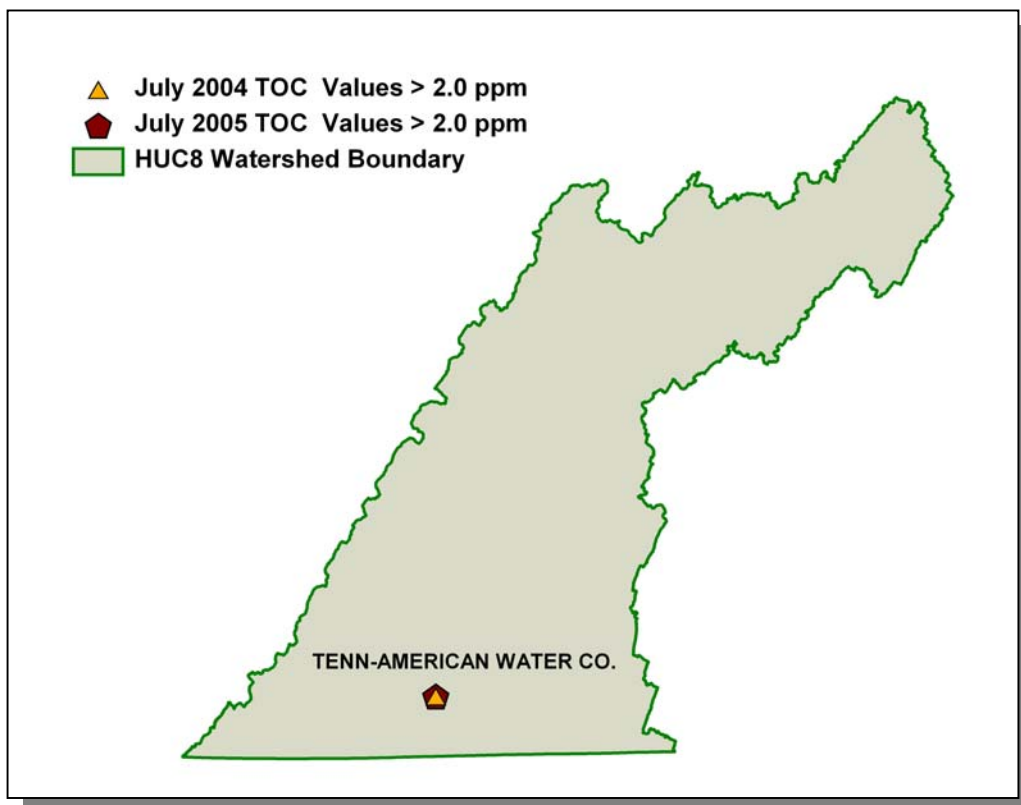


Figure 5-3. July 2004 and 2005 Raw Water Total Organic Carbon (TOC) Analysis in the Tennessee River Watershed.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305(b) Water Quality Report at <http://www.tdec.net/water.shtml>.

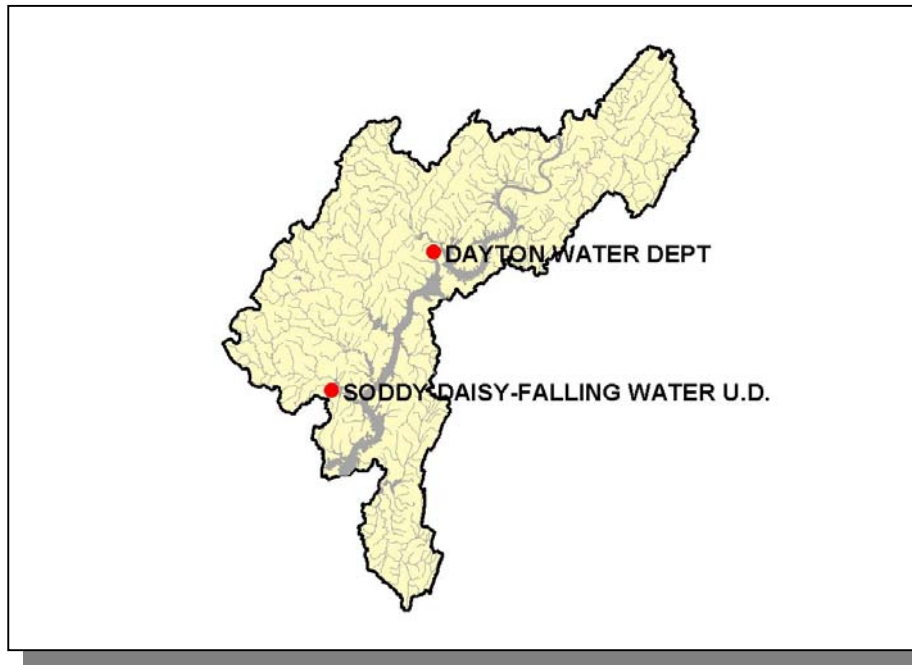


Figure 5-4. Locations of Community and Non-Community Public Water Supply Intakes in the Group 3 Portion of the Tennessee Portion of the Lower Tennessee River Watershed.

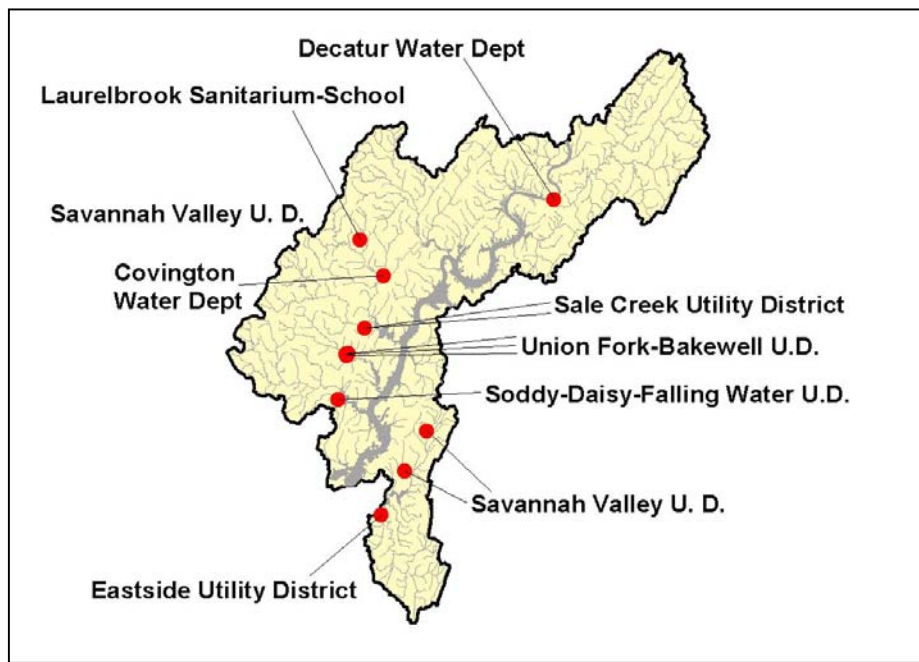


Figure 5-5. Locations of Community and Public Groundwater Supply Intakes in the Group 3 Portion of the Tennessee Portion of the Lower Tennessee River Watershed.

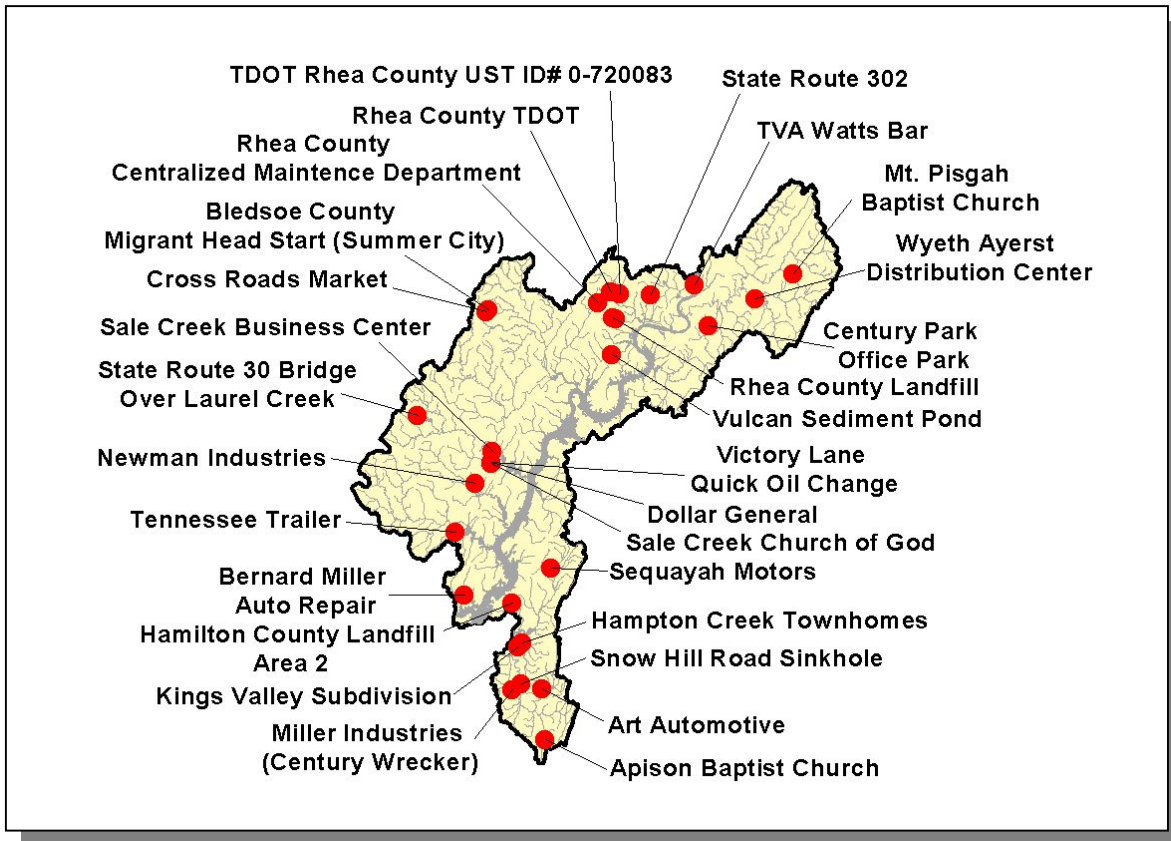


Figure 5-6. Locations of UIC (Underground Injection Control) Sites in the Group 3 Portion of the Tennessee Portion of the Lower Tennessee River Watershed. Injection wells include stormwater sinkholes modified for drainage, commercial/industrial septic tanks, and large capacity septic tanks.

5.3.B. State Revolving Fund. TDEC administers the state's Clean Water State Revolving Fund Program. Amendment of the Federal Clean Water Act in 1987 created the Clean Water State Revolving Fund (SRF) Program to provide low-interest loans to cities, counties, and utility districts for the planning, design, and construction of wastewater facilities. The U.S. Environmental Protection Agency awards annual capitalization grants to fund the program and the State of Tennessee provides a twenty-percent funding match. TDEC has awarded loans totaling approximately \$550 million since the creation of the SRF Program. SRF loan repayments are returned to the program and used to fund future SRF loans.

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.

SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility, whichever is shorter.

TDEC maintains a Priority Ranking System and Priority List for funding the planning, design, and construction of wastewater facilities. The Priority Ranking List forms the basis for funding eligibility determinations and allocation of Clean Water SRF loans. Each project's priority rank is generated from specific priority ranking criteria and the proposed project is then placed on the Project Priority List. Only projects identified on the Project Priority List may be eligible for SRF loans. The process of being placed on the Project Priority List must be initiated by a written request from the potential SRF loan recipient or their engineering consultant. SRF loans are awarded to the highest priority projects that have met SRF technical, financial, and administrative requirements and are ready to proceed.

Since SRF loans include federal funds, each project requires development of a Facilities Plan, an environmental review, opportunities for minority and women business participation, a State-approved sewer use ordinance and Plan of Operation, and interim construction inspections.

For further information about Tennessee's Clean Water SRF Loan Program, call (615) 532-0445 or visit their Web site at <http://www.tdec.net/srf>.



Figure 5-7. Location of Communities Receiving SRF Loans or Grants in the Lower Tennessee River Watershed. More information is provided in Appendix V.

5.3.C. Tennessee Department of Agriculture. The Tennessee Department of Agriculture's Water Resources Section consists of the federal Section 319 Nonpoint Source Program and the Agricultural Resources Conservation Fund Program. Both of these are grant programs which award funds to various agencies, non-profit organizations, and universities that undertake projects to improve the quality of Tennessee's waters and/or educate citizens about the many problems and solutions to water pollution. Both programs fund projects associated with what is commonly known as "nonpoint source pollution."

The Tennessee Department of Agriculture's Nonpoint Source Program (TDA-NPS) has the responsibility for management of the federal Nonpoint Source Program, funded by the US Environmental Protection Agency through the authority of Section 319 of the Clean Water Act. This program was created in 1987 as part of the reauthorization of the Clean Water Act, and it established funding for states, territories and Indian tribes to address NPS pollution. Nonpoint source funding is used for installing Best Management Practices (BMPs) to stop known sources of NPS pollution, training, education, demonstrations and water quality monitoring. The TDA-NPS Program is a non-regulatory program, promoting voluntary, incentive-based solutions to NPS problems. The TDA-NPS Program basically funds three types of programs:

- **BMP Implementation Projects.** These projects aid in the improvement of an impaired waterbody, or prevent a non-impaired water from becoming listed on the 303(d) List.

- **Monitoring Projects.** Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Lower Tennessee River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program (U.S. Environmental Protection Agency Assistance Agreements C9994674-00-0, C9994674-01-0, and C9994674-02-0).
- **Educational Projects.** The intent of educational projects funded through TDA-NPS is to raise the awareness of landowners and other citizens about practical actions that can be taken to eliminate nonpoint sources of pollution to the waters of Tennessee.

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development Districts, Watershed Districts, universities, and other groups. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information forestry BMPs is available at:

<http://tennessee.gov/agriculture/forestry/BMPs.pdf>, and the complaint form is available at: <http://tennessee.gov/environment/wpc/logform.php>.

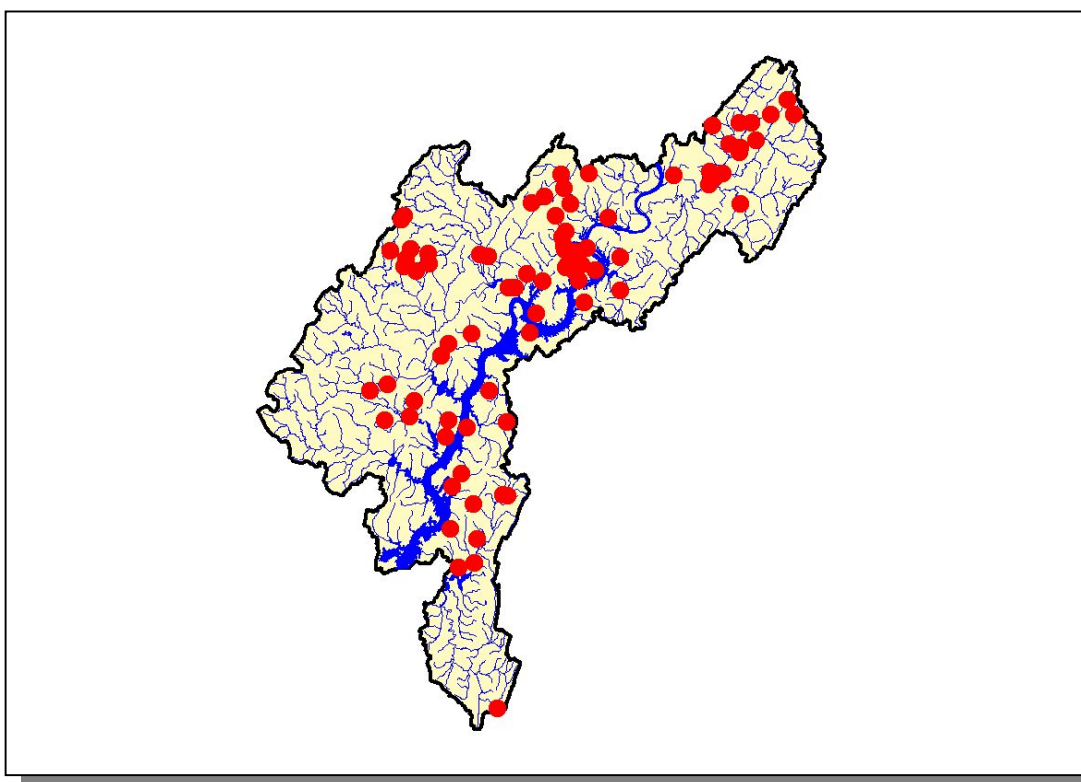


Figure 5-8. Location of BMPs installed from 1999 through 2003 in the Group 3 Portion of the Tennessee Portion of the Lower Tennessee River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. More information is provided in Appendix V.